

AMPHIPODS FROM A SOUTH AUSTRALIAN REEF

PART I.

By KEITH SHEARD, HON. ASSISTANT IN ZOOLOGY, SOUTH AUSTRALIAN MUSEUM.

Fig. 1-4.

INTRODUCTION.

The reef at Sellick's Beach is exceedingly rich in the smaller Crustacea, among which the Amphipoda are the most abundant in number and variety. The collection made by H. M. Hale (March to April, 1936) includes over two hundred separate forms, more than half of which are apparently not referable to known species. Yet from collections made for this Museum in Tasmania (N. B. Tindale), Queensland (J. T. Mortlock), and on Yorke Peninsula (H. Womersley, Dr. T. D. Campbell, and B. C. Cotton), all using the method described by H. M. Hale (Cumacea from a South Australian Reef, Rec. South Aust. Mus., 1936), it is apparent that this variety and number is not exceptional, and that careful collecting methods on most coastal reefs will provide a wealth of interesting, if hitherto neglected, material. The reef forms are in the main highly specialized for successful existence in their respective environments, and afford, when sufficient variety is studied, an excellent opportunity of separating ancestral stock characters from those resulting from habitus. A study of such forms should result in a better knowledge of the family relationships of the Order.

FAMILY HAUSTORIIDAE.

UROHAUSTORIUS gen. nov.

Back broad, tapering to antennae and telson. Eyes invisible. First antennae arise from a small process barely covered by the short, pointed rostrum. Accessory flagellum subequal to flagellum. Second antenna with penultimate joint of peduncle greatly expanded; first, second, and third short and ring-like. Mandible with simple cutting edge and accessory plate, spine-row feeble, molar large, palp long. Second joint the longest; third club-shaped with setae. First maxilla with one jointed palp. Maxilliped, plates short and narrow, palp with second joint expanded, setose; fourth, finger-like. Gnathopods 1-2 as for *Hausto-*

rins arcinus Slabber. Peraeopods 1-2 with dactyl spine-like. Peraeopod 3 with joints 2-5 expanded, heavily spined. Peraeopods 4-5, second joint widely expanded, remainder moderately expanded and armoured. Peraeopods 3-5 without dactyls. Pleopods well developed. Uropods heavily setose, biramous; uropod 3 with short, wide peduncle and widened rami, outer stouter and wider than inner, jointed near tip. Telson, short, broad, entire, margin with four spines. Sideplates: 1, short, pointed, curving forwards; 2, comparable, both hidden by the forward lobe of plate 3, which is the largest; broadly produced forward, the infero-distal edge narrowly produced backwards, and tipped with a long spine; 4, as long as, but narrower than 3, backward production comparable; 5, 6, 7, very small.

Uropods with setae, very finely plumose.

Genotype: *U. halei* sp. nov.

This genus represents a combination of the characters of *Haustorius*, *Urothoe* and *Phaeocephalopsis*, most noteworthy differences being spine-like dactyls on peraeopods 1 and 2; the shape and order of the sideplates; the entire telson, and the one-jointed palp of the first maxilla.

The two species here referred to *Urohaustorius* may be separated as follows:

- | | | | | | | | |
|-----|--------------------------------------|----|----|----|----|----|---------------|
| a. | Gnathopod 2, joints 2 and 5 subequal | .. | .. | .. | .. | .. | <i>halei</i> |
| aa. | Gnathopod 2, joint 2 twice joint 5 | .. | .. | .. | .. | .. | <i>vercoi</i> |

UROHAUSTORIUS HALEI sp. nov.

♀ Head short, broader than long, terminating in a small, sharply-pointed rostrum. Sideplates 1-2 small, acutely produced forwards, 3 the largest, longer than broad, covering sideplates 1-2 and the bases of gnathopods 1-2, and peraeopod 3, lower margin produced acutely backwards, terminating in a long spine; 4, large but smaller than 3, longer than broad, covering the base of peraeopod 4, narrowly produced backwards, and terminating in a long spine; 5-7 very small.

The third pleon segment is produced backwards, the process terminating in a spine. Pleon segment 4 the longest.

The body is free from setae or spines on its smooth surface.

Post antennal angles distinct, lateral corners moderate.

Eyes, not visible. Antenna 1: the pair are jointed to a small two-branched process arising from the frontal margin of the head. The junction of this process with the head is clearly visible. (See fig. 1 B.) First joint large, and tumid, as long as 2-3 together, and one and one-half times as broad as the second joint, which is setose, and more than twice as broad and slightly longer than the third; accessory flagellum 6-jointed, flagellum 8-jointed. Antenna 2: first joint small and ring-like, apparently soldered to the head; second free but short; third equal to 1 and 2 together, with the dorsal edge slightly produced and rounded; the fourth

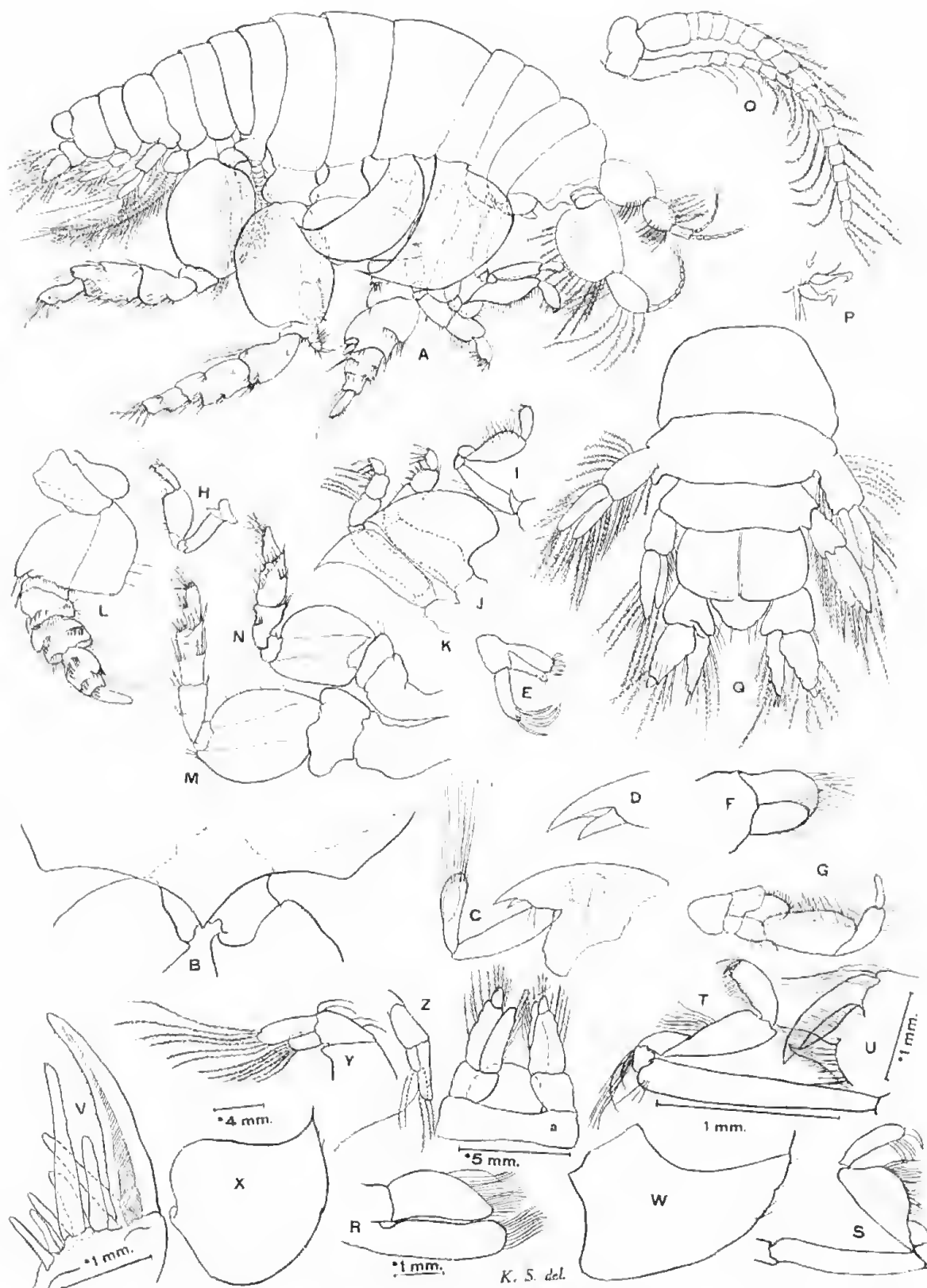


Fig. 1. A-Q, *Urohaustorius hahci*, type male; A, lateral view; B, rostrum and antennal process; C, mandible; D, cutting edge of mandible; E, maxilla 1; F, maxilla 2; G, maxilliped; H, gnathopod 1; I, gnathopod 2; J-N, pereopods 1-5; O, pleopod 3; P, coupling hooks Pl. 3; Q, uropods and telson. R-a, *Urohaustorius verecui*; R, maxilla 2; S, gnathopod 1; T, gnathopod 2; U, gnathopod 2, chela; V, pereopod 1, spines of joint 6 and dactyl; W, side-plate 3; X, side-plate 4; Y, uropod 1; Z, uropod 2; a, uropod 3 and telson.

joint is leaf-like, one and one-half times the length of the fifth, and varying from three times as broad in the male to twice as broad in the female, strongly setose, with plumose setae in both; the fifth joint is swollen, with long plumose setae; flagellum equal to length of fourth joint, 8-jointed; antenna not longer than head plus first four pereon segments. Mandible: palp long, first joint short and stout, second nearly twice third, which is fringed on the underside of the distal half with plumose setae; molar strong, cutting edge simple, accessory cutting edge simple; spine-row feeble. Maxilla 1 with one jointed palp, terminating in four long spines. Maxilla 2 with the outer plate twice as broad and slightly longer than the inner. Maxillipeds: inner plate small, outer small; palp with second joint long and swollen, bearing long setae, third curved, fourth cylindrical, weak.

Gnathopod 1: second joint long and narrow, third very small, fourth small, produced inferiorly, fifth as long as second but nearly twice as broad, sixth cylindrical, weak; seventh curved, very weak. Gnathopod 2 comparable with first, but slightly larger; finger opposed by a spine, forming a small chela.

Pereopod 1: side plate the largest; first joint distinct, twice as broad as long; second the longest; third ring-like, twice as broad as long; fourth half as long as second, and comparable in expansion; fifth subequal, spined on inferior margin; sixth half as broad and subequal in length; seventh spine-like. Pereopod 2: slightly longer than first, with plumose hairs on the inferior margin of the fourth and fifth joints. Pereopod 3: side plate little produced, weakly bilobed; distal lobe the larger, second joint expanded, articulated to third by a slight collar; third and fifth joints equally expanded, subequal; fifth less expanded, a little longer; sixth finger-like, equal in length to fourth; seventh not present; the whole appendage is relatively massive, the joints 3-5 studded with rows of spines. Pereopod 4 the longest; side plate very small; second joint longer than broad; third ring-like, 4-6 cylindrical, heavily spined; seventh not present. Pereopod 5 comparable to 4, fourth and fifth joints more produced distally.

Pleopods: stout, with plumose setae; third the longest, with its inner ramus more slender and about two-thirds as long as outer; two sickle-shaped coupling hooks on each peduncle, which is moderately expanded. Uropod 1 the longest; rami slightly shorter than peduncle, inner ramus slightly the shorter. Uropod 2 the smallest; rami subequal, longer than peduncle. Uropod 3 with rami and peduncle expanded, rami subequal; outer ramus longer and broader than inner, two-jointed, the joint comparable with those of the pleopod rami; is close to the distal end of the ramus. All uropods heavily setose with plumose setae. Telson one and one-half times as broad as long, semi-circular, undivided, with four marginal spines. Telson does not reach to end of peduncle of third uropod.

Length, type male, 2.5 mm.; ovigerous type female, 1.9 mm.

Loc. South Australia: Gulf St. Vincent, Sellick's Reef, burrowing in sand on sandy patches on reef; exceedingly common (H. M. Hale, Apl. 1936). Types in South Australian Museum, Reg. No. C. 2080, 2081.

This species, the most interesting Amphipod from the reef, has been named in recognition of the careful collecting work done there by Mr. H. M. Hale.

The male and female are little differentiated, although in the male the lateral lobes of the body segments are slightly more produced, and the body is flatter and slightly more leaf-like than in the female, which frequently assumes a more or less Sphaeromid-like shape. Immature males and females are much flatter than the mature forms, and the fourth pleon segment is not wider than the two adjoining in the specimens examined.

The species possesses long, stout, darkly-staining hairs on the antennae, pleopods, and uropods, sparsely scattered among the plumose setae. These stain blackly with magenta red, and the darkened interior appears to arise from well within the chiton. The whole has the appearance of a long hollow tube freely connected with interior of the appendage. The tubes are fringed with very fine setae, and appear to serve both sensory and aeration functions.

UROHAUSTORIUS VERCOI sp. nov.

This species is very close to *U. halci*, with the following as the chief differences: Antenna 1, accessory flagellum with five joints, flagellum with seven. Side-plate 4 nearly as wide as long (*U. halci* at least three times as long as wide).

Gnathopod 1, joint 2, one and one-half times joint 5 (*U. halci* with these joints subequal).

Gnathopod 2, with joint 2 elongate, more than twice joint 5 (*U. halci*, joints 2 and 5 subequal).

Uropod 1, inner ramus one-half outer (*U. halci*, subequal).

Uropod 2, inner ramus less than one-half outer (*U. halci*, more than half).

Length, 5 mm.

Loc. Western Australia: Geographe Bay (J. C. Verco).

In the type female the dactyls of peracopods 1-2 are unmistakable (fig. 1, V), while the antennal process is clearly marked off from the head.

The species is named after its collector, Dr. J. C. Verco, and is interesting as illustrating the wide range of the genus. In the same dredging was taken a species of *Haustorius* with the pleon segments very reduced, the telson cleft to the base, antennae little expanded, and with side-plates approaching those of *Urohaustorius*. This will be described later.

REFERENCES.

- Della Valle (1893) : *F. Fl. Neapel.* xx. pl. lx, fig. 22-23.
 Holmes, S. J. (1905) : *Bull. U.S. Bureau Fish.* xxiv, pl. v.
 Stebbing (1906) : *Das Tierreich*, 1f. xxi, pp. 118-148.
 Barnard (1932) : *Discovery Reports*, v, p. 94.

SIPHONOECETES SELLICKI sp. nov.

The points of difference from *S. australis* Stebbing⁽¹⁾ are as follows :

Rostrum : Definitely pointed, projecting beyond eye-lobes.

First Antenna : Five-jointed flagellum, the fifth joint minute.

Second Antenna : Fifth joint of peduncle the longest.

Head : Equal to longest pereon segment (fifth).

Side-plates : All are shallow, first and second acutely produced forwards, the remainder softly rounded.

Pleopods : Inner ramus two-thirds outer (*S. australis* sub-equal). Both rami are jointed very close to the proximal edge of the peduncle, and their roots are slender.

Uropods : First, outer ramus equals two-thirds peduncle, which is not spined. Second, outer ramus shorter than peduncle. The inner is small, and its base is partly overlapped by the peduncle, which is produced on its inner side to a rounded lobe (fig. 2 N), fringed with very short spines. The third uropod is vestigial, the outer ramus very short, is fringed with five long hairs. The peduncle is prolonged on its inner side, and studded with five spines. In the ventral view (fig. 2 N) it has the appearance of being open at the tip, forming a suction-plate. However, it is difficult to clearly define the detail at the magnification employed.

Loc. South Australia: Gulf St. Vincent, Sellick's Reef (H. M. Hale, 1936). Types in South Australian Museum, Reg. No. C. 2114, 2117.

This Amphipod lives in short, hollow pieces of *Cymodocea* stem⁽²⁾ loosely lined with silky material. The specimens described were collected in January, 1936, by Mr. H. M. Hale, when he noticed fragments of *Cymodocea* stem moving independently of the currents in a small rock pool at Sellick's Reef, at low tide. Eight stalks containing ovigerous females were found. Repeated searching since that date has only disclosed one more specimen. No males were discovered. The females of length 4 mm. contain 10-11-12 eggs arranged in echelon, the whole amphipod completely filling the tubal space.

(1) Stebbing, Mem. Aust. Mus., iv, 1910, p. 619, pl. lvi.

(2) Hale, Trans. Roy. Soc., S. Austr., xlviii, 1924, p. 225, and Crust. S. Aust. (Brit. Sci. Guild Handbook), 1929, p. 322.

S. sellicki bears its antennae in a characteristic cruciform manner; they are orange, spotted with black; the body is slatey-grey to the fifth peraeon segment, the remainder pallid. Infolding and rapid diminution in size commences with the fourth pleon segment, segments 5 and 6 being considerably reduced; the telson is as long as the fourth pleon segment.

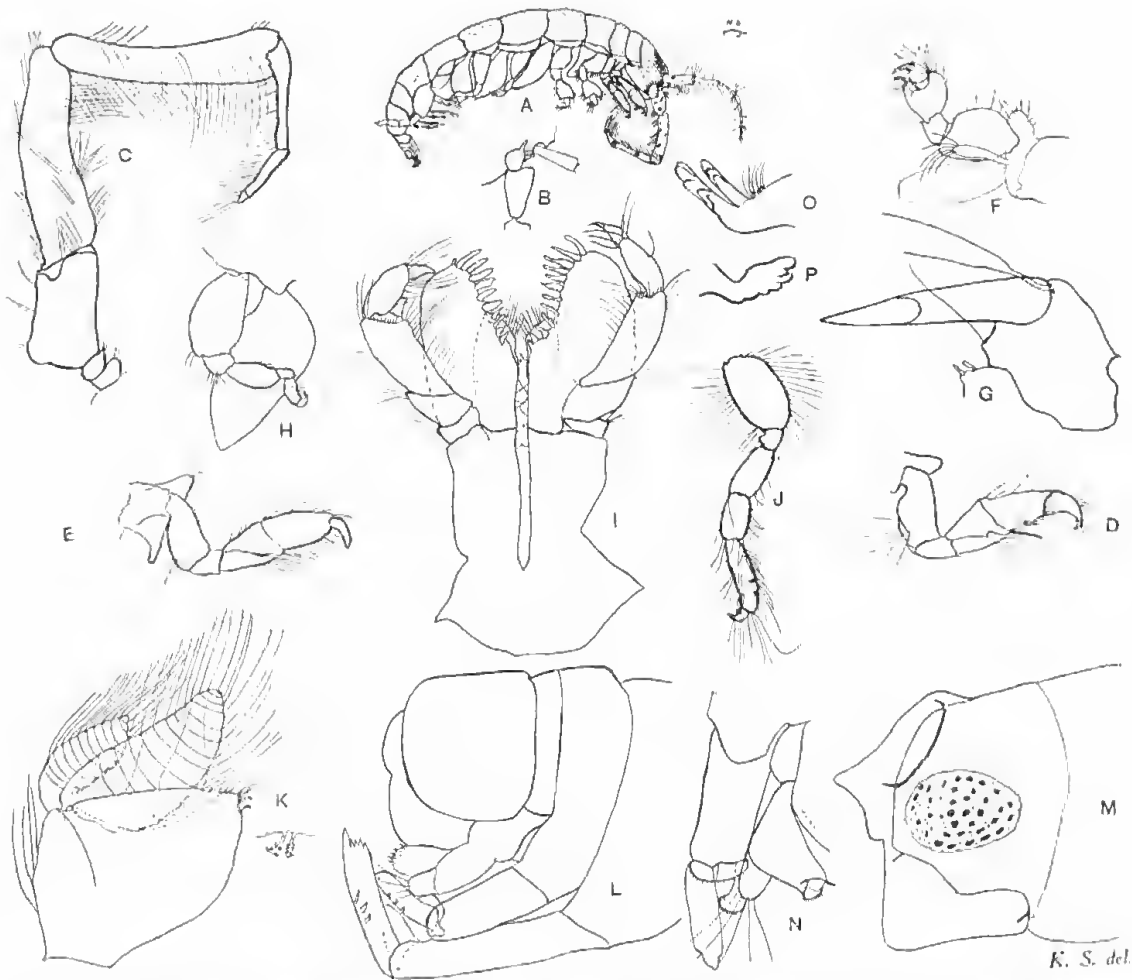


Fig. 2. *Siphonocetes sellicki*: A, lateral view of female; B, eye-lobe; C, second antenna; D, first gnathopod; E, second gnathopod; F, second peraeopod; G, finger of P; H, fourth peraeopod; I, maxilliped; J, fifth peraeopod; K, third pleopod; L, telson and uropods; M, head; N, second and third uropod; O, cutting edge of right mandible; P, cutting edge of left mandible.

The proportions of the peraeon appendages of the type specimen agree fairly closely with those for *Siphonocetes australis*, but the individual specimens vary slightly, as might be expected from the nature of their environment.

In general, the species bears stouter appendages than *S. australis*, and its appearance is slightly more robust; in all specimens high magnification and appropriate staining are necessary to detect the sutures of the sixth segment. Without

dissection it may be separated from *S. australis* by the following characteristics: the third joint of peraeopod 2 is cylindrical, as broad as long; the fifth joint of peraeopod 4 is twice as long as broad (*S. australis* one and one-half times as broad as long), and the small rostrum is sharply pointed (*S. australis* bluntly rounded). The species is very close to *S. smithianus* Rathbun.

FAMILY OEDICEROTIDAE.

EXOEDICEROS Stebbing.

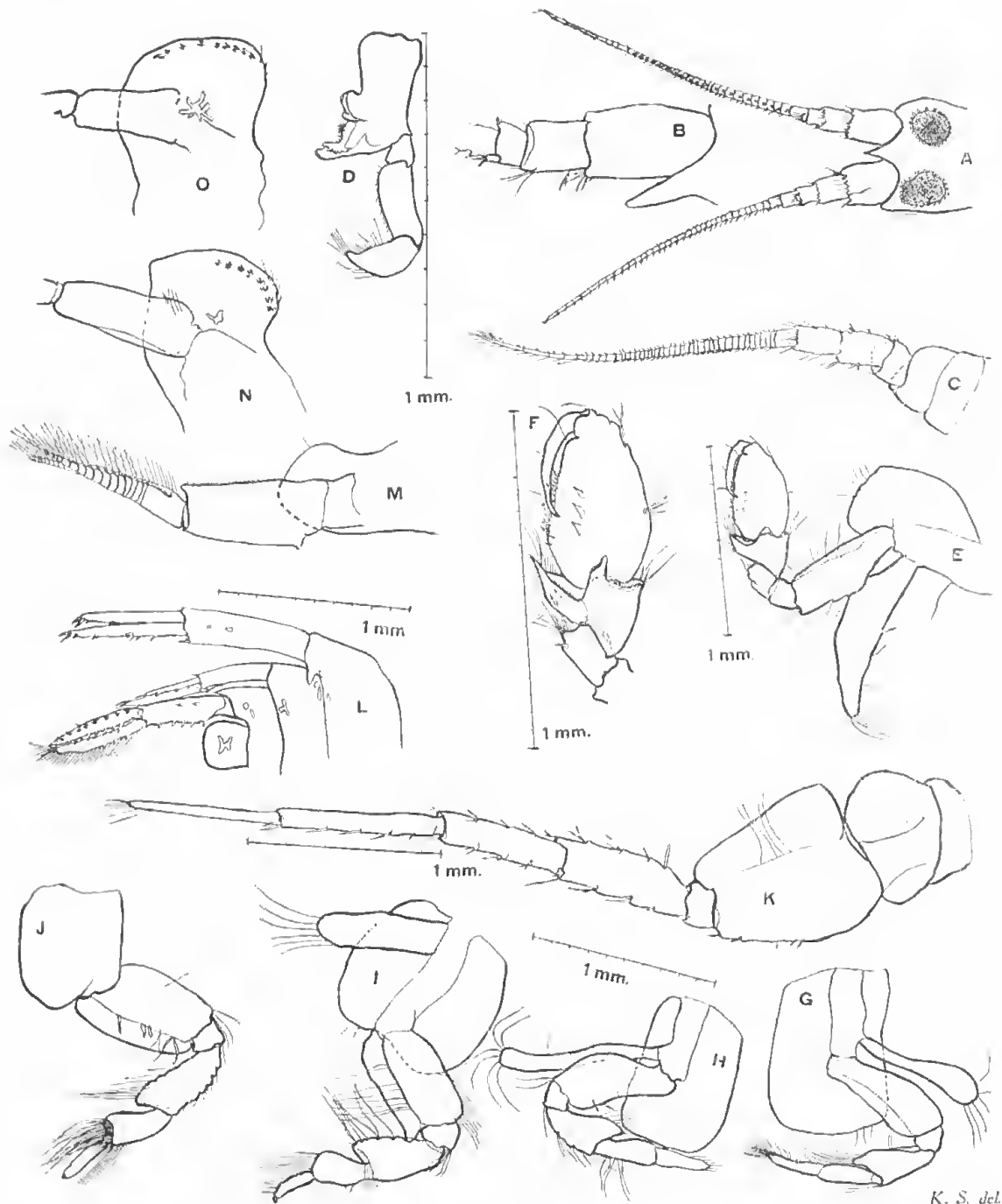
EXOEDICEROS MACULOSUS sp. nov.

♀ Eyes moderately large, oval, with the surface rounded. Antenna 1, joints of peduncle successively shorter and more slender; first joint as long as second and third together; flagellum of about 30 joints, each carrying a small calceoli which gives the flagellum a saw-like appearance; accessory flagellum, a single rudimentary joint, tipped with long setae. Antenna 2, first two joints of peduncle short and stout, appearing to fuse with the head; third is free and about one-half the width of the first; fourth is stouter than fifth and slightly longer, equal to twice third; flagellum as for antenna 1, but with about 40 joints; antenna 2 about one and one-third as long as antenna 1, and proportionately stouter. Mandible, well developed, palp large, first joint short, second three times, and third two and one-half times as long; molar, cutting edges and spine-row well developed; gnathopod 2 larger than 1, but of similar form; fifth joint widened and setose, produced to palm of oval sixth. Peraeopods 1 and 2 possess no finger, and have the fourth joint widened; fifth and sixth not widened, sub-equal. Peraeopods 3 and 4 have fourth and fifth joints only slightly widened. Peraeopod 5, first joint with very small plate, second joint quadrate, hind margin nearly straight; length of peraeopod 5 equals twice peraeopod 2.

Pleopods with side-plates of pleon segments 1-3 progressively larger, postero-lateral angles rounded; each of the plates of the pleon bears an inner row of double spines close to the inferior margin, and a large chromatophore at about the centre of the plate; these characteristic chromatophores are also present on the uropod segment and telson.

Uropod 1 bears stout spines on the sub-equal rami, inner ramus equal to peduncle. Uropod 1 is nearly twice as long as peduncle plus outer ramus of uropod 2, and one and one-half times as long as uropod 3. Uropod 2 the smaller and more slender; inner ramus slightly shorter than peduncle, outer slightly longer, both slightly spined.

Uropod 3 stout, with peduncle and outer ramus spined, inner ramus lanceolate, with long setae; rami equal, and equal to peduncle in length. Telson, small entire, quadrate, equal in length to second uropod segment; normally carried upturned.



K. S. del.

Fig. 3. *Eooidicops maculosus*, type female; A, antennae 1 and rostrum; B, peduncle of antenna 1; C, antenna 2; D, mandible; E, gnathopod 2; F, palm of E; G-K, pereopods 1-5; L, uropods and telson; M, pleopod 1; N-O, peduncles and side-plates of pleopods 2-3.

Length, 3 mm.

Loc. South Australia: Gulf St. Vincent, Sellick's Reef; common in sandy pools left at low tide (H. M. Hale, Apl. 1936). Types in South Australian Museum, Reg. No. C. 2084, 2085, 2086.

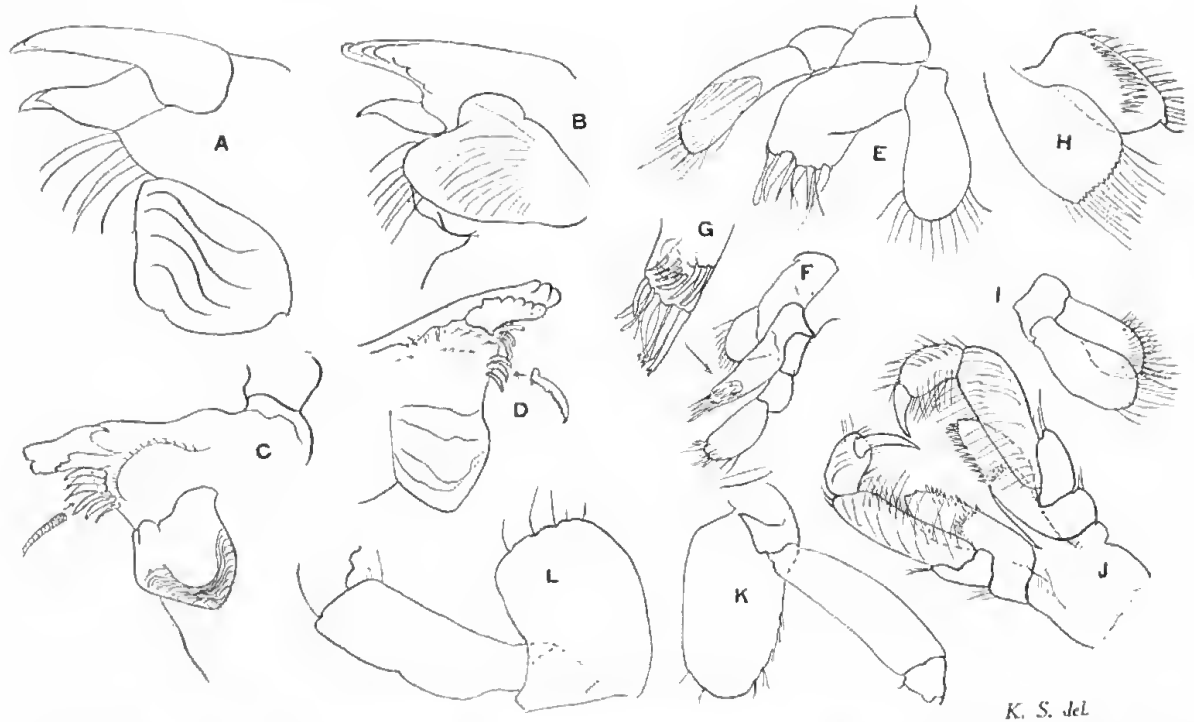


Fig. 4. Mandibles of *Exoediceros fossor* (A-B) and *E. maculosus* (C-D); maxilla 1 of *E. fossor* (E) and *E. maculosus* (F-G); maxilla 2 of *E. fossor* (I) and *E. maculosus* (J); maxilliped of *E. maculosus* (J); side-plate and gnathopod 1 of *E. fossor* (K) and *E. maculosus* (L).

Through the courtesy of the Australian Museum authorities I have been able to examine specimens of *Exoediceros fossor* (*Oedicerus arenicola* Haswell). (See fig. 2.) The main differences between this species and *E. maculosus* are as follows:

Size (mature females): *E. fossor*, length, 7 mm.; greatest width of peraeon, 3 mm. *E. maculosus*, length, 5 mm.; greatest width of peraeon, 1.5 mm. Rostrum: *E. fossor*, short, and not reaching beyond middle of first joint of peduncle of first antenna. *E. maculosus*, relatively longer, reaching beyond middle of first joint of peduncle of first antenna (this characteristic is constant for immature, sub-adult and adult specimens examined of both sexes).

Colouration (spirit specimens): *E. fossor*, no trace of chromatophores. *E. maculosus*, bright red chromatophores as described.

Mandible: *E. fossor*, spine-row weak; accessory cutting edge pointed and

simple. *E. maculosus*, spine-row with strong spines; accessory cutting edge small and dentate.

Maxilla 1: *E. fossor*, inner plate large. *E. maculosus*, inner plate small.

Maxilla 2: *E. fossor*, plates wide. *E. maculosus*, plates comparatively narrow.

Side-plate 1: *E. fossor*, five sets of spines on inferior edge; two spines on distal edge; narrow. *E. maculosus*, five spines on distal edge; comparatively wide.

Embryos still within the egg-case were possessed of fully-developed fifth peraeopods.

In washings from the wave-beaten beach (Hale, Sept. 1936), *Urohaustorius halei* and *Exoedicerus maculosus* were abundant.

REFERENCES.

- Haswell (1879) : *Proc. Linn. Soc., N.S. Wales*, iv, p. 325, pl. xxiv, 3.
Stebbing (1906) : *Das Tierreich*, xxi, p. 239.
Pirlot (1932) : *Siboga-Expeditie*, Livr. cxvii, Mon. xxxiii, b, p. 106.